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10/631,954	07/30/2003	M. Vikram Rao	2003-IP-010829U1	1780
Robert A. Kent Halliburton Energy Services 2600 South 2nd Street Duncan, OK 73536			EXAMINER LE, HOA T	
			ART UNIT 1773	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/631,954  
Filing Date: July 30, 2003  
Appellant(s): RAO, M. VIKRAM

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Elizabeth Durham  
For Appellant

**EXAMINER'S ANSWER**

Art Unit: 1773

This is in response to the appeal brief filed January 10, 2007 appealing from the Office action mailed August 10, 2006.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. However, the remark "The rejections are improper" is misplaced. "The statement cannot include any argument concerning the merits of the ground of rejection presented for review. Arguments should be included in the 'Argument' section of the brief." See MPEP 1205.02 (vi).

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

6,913,643

DEJAIFFE

7-2005

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

**Claims 1-17 are rejected under 35 U.S.C. 102(e) as being anticipated by the Dejaiffe patent (US 6,913,643).**

Claim 1: Dejaiffe teaches a lightweight aggregate comprising silica and alumina (abstract). The alumina is present in an amount of 8-14 wt% (col. 4, lines 5-8). The aggregate comprises typical large and small sizes (col. 5, lines 1-13). The smaller sized aggregate has approximately the size of sand (col. 5, lines 8-10). Typical dimension for sand is about 50

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μm to 2 mm as defined in the Academic Press Dictionary of Science and Technology (see attachment 1A) and the Dictionary of Physical Geography (see attachment 1B). Therefore, the aggregate falls within the broad claimed size range of 8 mesh or smaller (8 US mesh is about 2.40 mm particle size). The aggregate contains voids (col. 5, lines 8-10 and 21-23).

The method of making aggregates as taught by Dejaiffe comprises pelletizing and subsequently firing (i.e. sintering) a glass composition the glass composition is a combustion product. See Dejaiffe, col. 4, lines 58-65 and col. 5, lines 7-12. These process steps inherently produce particulates that are substantially spherical. This inherence fact is actually acknowledged by Appellant. At page 7 paragraph 25 of the instant specification, it's stated: "When such combustion products are pelletized and sintered, they produce particulates that are substantially spherical and that exhibit specific gravities of below about 2.2." Here, the glass composition is a combustion product and the glass is pelletized and sintered to form the aggregate of Dejaiffe. Therefore, not only aggregates of Dejaiffe possess spherical shape, they also exhibit specific gravities of below 2.2 as claimed.

Claims 2-3: See col. 4, lines 5-10

Claim 4: See col. 6, lines 30-32.

Claim 5: See col. 5, lines 45-50 (bottom ash and fly ash).

Claim 6: See rejection to claim 1.

Claim 7: considered met by inherence because the Dejaiffe aggregate comprises the same composition as the claimed particulate. See rejections in claims 2-5 above.

Claim 8: See col. 5, lines 34-37.

Claim 9: See col. 5, lines 8-10 and 21-23.

Claim 10: See rejection to claims 1 and 9 above.

Claims 11-12: See col. 4, lines 5-10

Claim 13: See col. 6, lines 30-32

Claims 14-17: See rejections to claims 6-8 above.

### **(10) Response to Argument**

#### **A. Response to Appellant argument that Dejaiffe fails to disclose aggregates having a substantially spherical shape as required in the instant claims.**

**A.1.** “Substantially spherical shape” is defined in Appellant’s specification at page 7, paragraph [025] as having an aspect ratio of 0.7 or greater. Although Dejaiffe does not explicitly disclose the shape of the aggregates, the spherical shape of the aggregates is a necessarily inherent product by the process of making the aggregates disclosed in Dejaiffe patent. The process of making aggregates comprises forming a glass composition by heating a mixture of glass and foaming agent in the presence of oxygen (Dejaiffe, col. 4, lines 59-56), pelletizing and firing the glass composition to form the aggregates (col. 5, lines 7-12). The process of pelletizing and sintering a combustion product inherently produces particulates that are substantially spherical and exhibit specific gravities of below 2.2. This inherence fact is acknowledged in Appellant’s own specification. At page 7, paragraph [025] of the instant specification, it is stated that:

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When such combustion products are pelletized and sintered, they produce particulates that are substantially spherical and that exhibit specific gravities of below about 2.2.

(emphasis added)

Here, the glass composition is a combustion product because it is formed from a burning reaction in the presence of oxygen (see Dejaiffe, col. 4, lines 58-65).<sup>1</sup> The combustion product (i.e. glass composition) is then pelletized and sintered (see Dejaiffe, col. 5, lines 7-12). Therefore, it is necessarily inherent that the product produced by such process is particulates that are substantially spherical.

In addition, Dejaiffe states that the aggregates are formed by pelletizing (col. 5, lines 7-12). Pelletizing is a process of making into pellet (see attachment 3A), and pellet is defined in the Webster's Dictionary as a "small round or spherical body" (see attachment 3B). Therefore, the aggregates taught by Dejaiffe are substantially spherical; that is having an aspect ratio of 0.7 or greater as defined in Appellant's specification having an aspect ratio of 0.7 or greater.

**A.2.** Appellant argued that the process disclosed in Dejaiffe does not necessarily produce particulates having a substantially shape. To support this argument, Appellant cites Randall M. German in "Sintering Theory and Practice" and the US patent No. 3,125,794. Relying on German's Sintering Theory and Practice, Appellant states that "the processes of sintering

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<sup>1</sup> See claims in the US Patent Application Publication No. 2003/0084683 A1 (see attachment 4). It is noted that the glass composition described at col. 4, lines 58-65 of the Dejaiffe patent is a product of the process disclosed in US Patent Application No. 10/011,944, which is published as the US Patent Application Publication No. 2003/0084683A1.

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and pelletization may produce aggregates of different shapes.” (emphasis added). However, pelletization is NOT discussed anywhere in the German’s article cited by Appellant.

Because the process in the German’s article misses the critical pelletizing step, it is not the same as the process taught by Dejaiffe. Therefore, the aggregates derived from the German’s sintering process cannot be comparable to the product produced by the process taught the Dejaiffe patent. With regard to the US patent 3,125,794, the Examiner questions the relevance of this patent to the process taught by Dejaiffe. The patent 3,125,794 teaches a method of making pellets by molding from a strip or ribbon. A strip or ribbon is not a combustion product, and molding is not pelletization and sintering. Therefore, this patent has nothing to do with the process taught in the Dejaiffe patent, or the process disclosed in the instant specification. And thus it proves nothing.

**A.3.** Appellant argued that the Examiner “improperly relies on Appellant’s specification to erroneously conclude that the aggregates in *Dejaiffe* inherently have a substantially spherical shape.” Contrary to Appellant’s assertion, it’s proper to rely on Appellant’s disclosure as an admission of inherency. In Appellant’s own specification, it is acknowledged that pelletizing and sintering a combustion product would produce aggregates having a spherical shape (instant specification page 7, paragraph [025]). Here, *Dejaiffe* teaches pelletizing and firing a glass composition to form aggregates wherein the glass composition is a combustion product (formed by burning in oxygen). Therefore, it is necessarily inherent that the resulting aggregates would have a spherical shape as a result of pelletizing and sintering.

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Additionally, it is known that pelletizing is a process of making into pellet and pellet by definition is a small round or spherical body; and it is also known in the art that sintering is to further improve the existing shape of particulates. Therefore, pelletizing and sintering in that order would necessarily produce substantially spherical aggregates. Thus, what Appellant states at paragraph [025] of the instant specification is an admission of inherency and reliance on it is permissible.

More importantly, a recent litigation affirms the trial court decision that **“if a layer would form in situ every time a process is followed, the layer is an inherent property of the process, even if unrecognized”**. In re Omeprazole Patent Litigation - Astra Aktiebolag, Aktiebolaget Hassle, Astra Merck Enterprises Inc., Astra Merck Inc., Kbi-E, Inc., Kbi, Inc., And Astrazeneca LP v. Andrx Pharmaceuticals, Inc., And Genpharm, Inc., Kremers Urban Development Co., And Schwarz Pharma, Inc. (Fed Cir, 04-1562,-1563,-1589, 4/23/2007). See attachment 5, paragraph bridging pages 14 and 15. Here, from Appellant’s admission of inherency, substantially spherical particulates would form in situ every time a process, namely pelletizing and sintering, is followed; therefore, substantially spherical shape is an inherent property of the pelletizing and sintering process even if unrecognized. Furthermore, in Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc., 246 F.3d 1368, 1376 (Fed. Cir. 2001), it is decided that newly discovered results of known processes are not patentable if those results are inherent in the known processes. Here, the known processes are pelletizing and sintering, and the newly discovered result is the substantially spherical shape of the resulting aggregates. Therefore, substantially spherical shape as

claimed should not be patentable because it is an inherent result in the known processes disclosed in the Dejaiffe patent.

**B. Response to Appellant's argument that Dejaiffe cannot anticipate claims 1-9 because Dejaiffe does not disclose a particle size of 8 U.S. Mesh or smaller, as required in independent claim 1.**

8 US mesh is about 2.38 mm particle size (see attachment 2). Dejaiffe teaches a lightweight aggregate comprising typical large and small sizes (col. 5, lines 1-13). The smaller sized aggregate has approximately the size of sand (col. 5, lines 8-10). Typical dimension for sand is about 50  $\mu\text{m}$  to 2 mm as defined in the Academic Press Dictionary of Science and Technology (see attachment 1A) and the Dictionary of Physical Geography (see attachment 1B). Therefore, the aggregates of sand-dimension taught by Dejaiffe fall within the claimed broad size range of 8 mesh or smaller.

**C. Response to Appellant's argument that Dejaiffe cannot anticipate dependent claims 6 and 15 because Dejaiffe does not disclose particle size of 25 U.S. Mesh or smaller, as claims 6 and 15 recite.**

25 US mesh is about 710  $\mu\text{m}$  particle size (see attachment 2). Dejaiffe teaches a lightweight aggregate comprising typical large and small sizes (col. 5, lines 1-13). The smaller sized aggregate has approximately the size of sand (col. 5, lines 8-10). Typical dimension for

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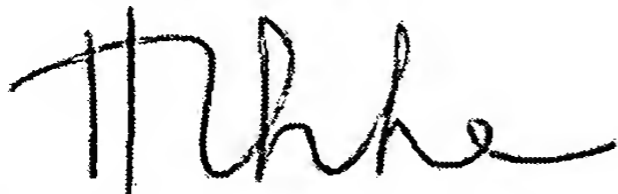
sand ranges from about 50  $\mu\text{m}$  to 2 mm as defined in the Academic Press Dictionary of Science and Technology (see attachment 1A) and the Dictionary of Physical Geography (see attachment 1B). Therefore, the aggregates of sand-dimension as taught by Dejaiffe encompass the claimed size range of 25 mesh or smaller.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,



Hoa Le

Conferees:

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**CAROL CHANEY**  
**SUPERVISORY PATENT EXAMINER**

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Academic Press Dictionary of Science and Technology  
from Elsevier Science & Technology

1A

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## sand

Geology

1. A small, somewhat rounded fragment or particle of rock ranging from 0.05 to 2 mm in diameter, and commonly composed of quartz.
2. A loose aggregate or more or less unconsolidated deposit, consisting essentially of sand-sized rock particles or medium-grained clastics.
3. **sands**, a tract or region composed primarily of sand.

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### Citing this entry

sand (1992). In *Academic Press Dictionary of Science and Technology*. Retrieved May 11, 2007, from <http://www.xreferplus.com/entry/3154469>

1A

xreferplus



Blackwell  
Publishing

The Dictionary of Physical Geography  
from Blackwell Publishers

1B

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## sand

Both a type of soil texture and a particle size class, ranging from 63 to 2000 microns. Since sand is a particle size that is readily transported by both water and wind, it is commonly found in fluvial and aeolian deposits. (DSGT)

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### Citing this entry

sand. (2000) In *The Dictionary of Physical Geography*. Retrieved May 11, 2007. from <http://www.xreferplus.com/entry/758317>

1B



# Particle Size / Screen Mesh Comparison

(800) 440-MESH Phone: (360) 835-8936 Fax: (360) 835-8966

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Particle Size		Stainless Steel Bolting Cloth					Market Grade					U.S. Std. Sieve	
Inches	Microns	Mesh	Opening		Wire Dia.	Open Area	Mesh	Opening		Wire Dia.	Open Area	Closest Sieve	Opening In Inches
			Inches	Microns				Inches	Microns				
.2500	7097						3	.2790	7087	.0540	70.1%		
.2230	5660						4	.2023	5138	.0475	65.9%	3.5	.2205
.1870	4750						4	.1870	4750	.0630	56.0%	4	.1870
.1570	4000						5	.1590	4039	.0410	63.2%	5	.1575
.1320	3350						6	.1318	3348	.0348	62.7%	6	.1319
.1110	2820						7	.1080	2743	.0350	57.2%	7	.1102
.0937	2380						8	.0964	2449	.0286	60.2%	8	.0929
.0787	2000						10	.0742	1885	.0258	56.3%	10	.0787
.0730	1854						11	.0730	1854	.0180	64.5%		
.0661	1680	14	.0620	1575	.0090	76.4%	12	.0603	1532	.0230	51.8%	12	.0669
.0555	1410	16	.0535	1359	.0090	73.3%	14	.0510	1295	.0204	51.0%	14	.0551
.0469	1190	18	.0466	1184	.0090	70.2%	16	.0445	1130	.0181	50.7%	16	.0465
.0410	1041	20	.0410	1041	.0090	67.2%							
.0394	1000	22	.0380	965	.0075	69.7%	18	.0386	980	.0173	48.3%	18	.0394
.0331	841	24	.0342	869	.0075	67.2%	20	.0340	864	.0162	46.2%	20	.0335
.0310	784	26	.0310	787	.0075	64.8%							
.0278	707	28	.0282	716	.0075	62.4%	24	.0277	704	.0140	44.2%	25	.0280
.0268	681	30	.0268	681	.0065	64.8%							
.0248	630	32	.0248	630	.0065	62.7%							
.0234	595	34	.0229	582	.0065	60.7%						30	.0236
.0213	541	36	.0213	541	.0065	58.7%	30	.0203	516	.0128	37.1%		
.0197	500	38	.0198	503	.0065	56.7%						35	.0197
.0185	470	40	.0185	470	.0065	54.8%							
.0183	465	42	.0183	465	.0055	59.1%							
.0172	437	44	.0172	437	.0055	57.4%	35	.0176	447	.0118	37.9%		
.0165	420	46	.0162	411	.0055	55.8%						40	.0167
.0153	388	48	.0153	389	.0055	54.2%	40	.0150	381	.0104	36.0%		
.0145	368	50	.0145	368	.0055	52.6%							
.0139	354	52	.0137	348	.0055	51.0%						45	.0140
.0130	330	54	.0130	330	.0055	49.4%							
.0127	323	58	.0127	323	.0045	54.6%							
.0122	310	60	.0122	310	.0045	53.3%							
.0117	297	62	.0116	295	.0045	51.7%						50	.0118
.0111	282	64	.0111	282	.0045	50.7%	50	.0110	279	.0090	30.3%		
.0106	270	70	.0106	269	.0037	54.9%							
.0102	260	72	.0102	259	.0037	53.8%							
.0098	250	74	.0098	249	.0037	52.7%						60	.0098
.0095	241	76	.0095	241	.0037	51.7%							
.0091	231	78	.0091	231	.0037	50.6%	60	.0092	234	.0075	30.5%		
.0088	224	80	.0088	224	.0037	49.6%							
.0083	210	84	.0084	213	.0035	49.8%						70	.0083
.0079	200	88	.0079	201	.0035	47.9%							
.0076	193	90	.0076	193	.0035	47.8%							
.0070	177	94	.0071	180	.0035	45.0%	80	.0070	178	.0055	31.4%	80	.0071
.0065	165	105	.0065	165	.0030	46.9%							
.0059	149	120	.0058	147	.0025	47.3%	100	.0055	140	.0045	30.3%	100	.0059
.0049	125	145	.0047	119	.0022	46.4%	120	.0046	117	.0037	30.5%	120	.0049
.0041	105	165	.0042	107	.0019	47.1%	150	.0041	104	.0026	37.9%	140	.0042



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■ **pelletize** *vt* -ED/-ING/-S

: to make into pellets

» *pelletize* foodstuffs for animals and fowl«

» *pelletize* ore«

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**pellet** *n* -s often attrib

[ME *pelet*, *pelote*, fr. MF *pelote*, fr. (assumed) VL *pilota*, dim. of L *pila* ball — more at [PILL](#)]

**1 a** : a usu. small round or spherical body : a little ball

**b** : a small cylindrical chunk of compressed feeding stuffs used for livestock, poultry, or pels to avoid waste and to increase the attractiveness of the food

**c** : a small cylindrical or ovoid compressed mass (as of a hormone) for implantation in muscular tissues

**d** : a wad or bolus of indigestible material (as bones and other resistant remains of prey) regurgitated by a carnivorous bird

**e** : a small firm mass of dung (as that dropped by a mouse or rabbit)

**2 a** : a usu. stone ball used as a missile (as in a mangonel) during later medieval times

**b** : CANNONBALL

**c** : a ball for firearms: [BULLET](#)

**d (1)** : one of a charge of small shot

» *pellets of buckshot*«

**(2)** : a piece of small shot fired singly (as from a BB gun)

» *pellet gun*«

**e** : an imitation bullet (as of cork, paper, wax) for use in a popgun

**3 heraldry** : a roundel sable: [OGRESS](#), [GUNSTONE](#)

**4 a** : a circular boss in decorative work

**b** : BEAD 4g



US 20030084683A1

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(19) **United States**(12) **Patent Application Publication**

Dejaiffe et al.

(10) Pub. No.: **US 2003/0084683 A1**(43) Pub. Date: **May 8, 2003**(54) **FOAM GLASS AND METHOD OF MAKING**(76) Inventors: Robert Dejaiffe, Kennewick, WA (US);  
Mark Young, Benton City, WA (US)Correspondence Address:  
Douglas E. McKinley, Jr.  
P.O. Box 202  
Richland, WA 99352 (US)

(21) Appl. No.: 10/011,944

(22) Filed: Nov. 5, 2001

**Publication Classification**(51) Int. Cl.<sup>7</sup> ..... C03B 19/08

(52) U.S. Cl. .... 65/17.5; 65/22

(57) **ABSTRACT**

A method of making a foam glass having a substantially uniform pore size by first providing a substantially homogeneous mixture of a milled glass and an activated carbon foaming agent, and then heating said mixture in the presence of oxygen to a temperature sufficient to react said foaming agent with oxygen. Preferably, the mixture is heated to a temperature of between about 700° C. and about 850° C., and more preferably the mixture is heated to a temperature of between but not limited to about 750° C. and about 800° C. The milled glass is preferably provided as waste soda lime glass. Preferably, the carbon foaming agent is milled to a substantially uniform particle size of less than about 400 mesh, more preferably less than about 325 mesh, and more preferably less than about 270 mesh. Preferably, the glass precursor is milled to a substantially uniform particle size of less than about 400 mesh, more preferably less than about 325 mesh, and more preferably less than about 270 mesh.

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## FOAM GLASS AND METHOD OF MAKING

### CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Not Applicable

### BACKGROUND OF THE INVENTION

[0002] It has long been known that foamed glass, a form of glass characterized by numerous voids within the glass, can be formed with a variety of organic and inorganic materials. By mixing a glass precursor with a proper foaming agent, and heating it to the melting temperature of the glass precursor, a foam glass may be formed. Voids are formed in the glass by a foaming agent that forms a gas at a temperature compatible with the melting characteristics of the glass.

[0003] Among the foaming agents that have been successfully used in forming foam glass are sulfate salts, primarily sodium (sulfate). The sodium participates in the melting reaction, releasing  $\text{SO}_2$  in the reaction. This is convenient for glasses formed with a foam glass precursor such as soda-lime cullet, but there are drawbacks. In harder glasses, the sulfate salts may dissociate before the reaction starts, and the product smells of sulfur when cells are broken. Carbonate salts as the foaming agent have also been shown to generate foam glass, generating  $\text{CO}$  and/or  $\text{CO}_2$  in a similar manner. The resulting product has no unpleasant odor, but the decomposition may occur too soon for successful foaming. Bound water can be a foaming agent, and can be found in perlite, some clays and other minerals. At least one commercial process forces water into soda-lime glass in an autoclave to trap it as the foaming agent. The release of the water at the right time to form cells is even more difficult, and may be limited to processes where the heating rate to the softening point can be very rapid. This works in very small product sizes such as perlite beads and single hollow glass cells, but becomes more difficult as the product size grows. This method has also been used where the product is heated in a microwave.

[0004] Carbon has also been shown to be useful a foaming agent. One drawback of carbon is that it oxidizes slowly, thus, it will start to oxidize before the glass softens, so it is difficult to provide the appropriate amount for oxidizing at the foaming temperature. In all of these methods, variables related to the reaction temperatures and reaction rates of the foaming agents have limited the consistency of the voids formed in the resulting foam glasses. The failure to produce consistently sized voids within the glass in turn produces inconsistent strength in the foam glass products made by the prior art methods, which hinders their usefulness in commercial applications.

[0005] These and other drawbacks of the prior art have created a need for methods and materials for forming foam glass that is consistent in its cell structure and form, and which are readily scalable to large scale processing operations.

### BRIEF SUMMARY OF THE INVENTION

[0006] Accordingly, the present invention is a method of making a foam glass product that provides a consistent pore size. The invention is enabled by the discovery that activated

carbon produces an ideal reaction when heated with foam glass precursor. This reaction releases the correct amount of gas at the correct temperatures to allow the formation of a consistent product having consistent pore sizes within the foam glass. Foam glass formed with activated carbon thus exhibits a consistent strength profile, allowing the foam glass to be used in a variety of commercial applications.

[0007] Accordingly, the present invention is a method of making a foam glass having a substantially uniform pore size by first providing a substantially homogenous mixture of a milled glass and an activated carbon foaming agent, and then heating said mixture in the presence of oxygen to a temperature sufficient to react said foaming agent with oxygen. Preferably, the mixture is heated to a temperature of between about  $700^\circ\text{C}$ . and about  $850^\circ\text{C}$ ., and more preferably the mixture is heated to a temperature of between about  $750^\circ\text{C}$ . and about  $800^\circ\text{C}$ . The present invention finds particular utility in providing a recycling pathway for waste soda lime glass as the glass precursor. Accordingly, it is preferred that the milled glass be provided as waste soda lime glass. The method of the present invention is preferably carried out by carefully controlling the particle sizes of both the activated carbon foaming agent and the glass precursor. Accordingly, it is preferred that both the milled glass and the activated carbon be milled to a substantially uniform particle size. Preferably, the carbon foaming agent is milled to a substantially uniform particle size of less than about 270 mesh, more preferably less than about 325 mesh, and more preferably less than about 400 mesh. Similarly, it is preferred that the glass precursor is milled to a substantially uniform particle size of less than about 270 mesh, more preferably less than about 325 mesh, and more preferably less than about 400 mesh.

[0008] The present invention finds particular utility in providing a pathway for the recycling of waste glass. Of particular note are glasses generated in high temperature waste treatment systems, such as those manufactured by Integrated Environmental Technologies, LLC of Richland Wash. These systems utilize a plasma heating system and are capable of transforming a wide variety of materials into a vitreous glass a high value synthesis gas. Accordingly, as used herein "waste glass" should be understood to encompass both post consumer waste glass and the glass products produced by these high temperature systems.

### DETAILED DESCRIPTION OF THE INVENTION

[0009] In a preferred embodiment of the present invention, the process starts with a glass of particle size suitable for feeding into a ball mill. There it is further reduced in size to a fine powder in the range of 10 to 50 microns. The glass powder is then mixed intimately with the activated carbon foaming agent. The prepared mix is then put into a mold for heating to the foaming temperature. The mold is preferably made of a non-stick material (such as carbon or aluminum nitride), or it can be made of a non-oxidizing metal coated with a suitable parting agent.

[0010] The filled and usually covered mold is placed into an oven or lehr to raise it to the foaming temperature. The appropriate peak temperature for foaming is dependent on the melting point of the glass and the slope of the viscosity curve at the melting point. A soft glass may foam at about

750 C. Typical soda-lime cullet is foamed at about 775 C. A hard glass may foam as high as 1000 C or more.

[0011] When the foaming temperature is reached, it is necessary to hold that temperature for a short period of time while the heat penetrates to the center of the material and the oxidation of the carbon is completed. The time required is dependent on the size and mass of the filled mold. After foaming, the temperature is reduced to the annealing point while stress is relieved, and then reduced to room temperature. The resulting foam object will have sealed surfaces, and a closed cellular structure. The density can be varied according to the packing of the glass powder and the amount of activated carbon foaming agent added.

[0012] It is generally desirable to complete the foaming operation as quickly as possible to avoid crystallization within the glass. If the oxidation of the activated charcoal is retarded by the lack of adequate oxygen within a closed mold, the mold may be ventilated and/or an additional oxidizing agent, including but not limited to sodium nitrate may be added to the precursor mix.

[0013] Closure

[0014] While a preferred embodiment of the present invention has been shown and described, it will be apparent to those skilled in the art that many changes and modifications may be made without departing from the invention in its broader aspects. The appended claims are therefore intended to cover all such changes and modifications as fall within the true spirit and scope of the invention.

I claim:

1) A method of making a foam glass having a substantially uniform pore size comprising the steps of:

- a. providing a substantially homogeneous mixture of a milled glass and an activated carbon foaming agent,
- b. heating said mixture in the presence of oxygen to a temperature sufficient to react said foaming agent with oxygen.

2) The method of claim 1 wherein said mixture is heated to a temperature of between about 700° C. and about 850° C.

3) The method of claim 1 wherein said mixture is heated to a temperature of between about 750° C. and about 800° C.

4) The method of claim 1 wherein said milled glass is provided as waste soda lime glass.

5) The method of claim 1 wherein said milled glass is provided as waste glass derived from the processing of waste materials.

6) The method of claim 1 wherein said activated carbon foaming agent is milled to a substantially uniform particle size.

7) The method of claim 6 wherein said activated carbon foaming agent is milled to a substantially uniform particle size of less than about 270 mesh.

8) The method of claim 6 wherein said activated carbon foaming agent is milled to a substantially uniform particle size of less than about 325 mesh.

9) The method of claim 6 wherein said activated carbon foaming agent is milled to a substantially uniform particle size of less than about 400 mesh.

10) The method of claim 1 wherein said milled glass is milled to a substantially uniform particle size.

11) The method of claim 10 wherein said milled glass is milled to a substantially uniform particle size of less than about 270 mesh.

12) The method of claim 10 wherein said milled glass is milled to a substantially uniform particle size of less than about 325 mesh.

13) The method of claim 10 wherein said milled glass is milled to a substantially uniform particle size of less than about 400 mesh.

14) A method of making a foam glass having a substantially uniform pore size comprising the steps of:

- a. milling a glass precursor to a substantially uniform particle size,
- b. milling an activated carbon foaming agent to a substantially uniform particle size,
- c. providing a mixture of said milled glass precursor and said milled carbon foaming agent,
- d. heating said mixture in the presence of oxygen to a temperature sufficient to react said foaming agent with oxygen.

15) The method of claim 14 wherein said mixture is heated to a temperature of between about 700° C. and about 850° C.

16) The method of claim 14 wherein said mixture is heated to a temperature of between about 750° C. and about 800° C.

17) The method of claim 14 wherein said milled glass is provided as waste soda lime glass.

18) The method of claim 14 wherein said activated carbon foaming agent is milled to a substantially uniform particle size of less than about 270 mesh.

19) The method of claim 14 wherein said activated carbon foaming agent is milled to a substantially uniform particle size of less than about 325 mesh.

20) The method of claim 14 wherein said activated carbon foaming agent is milled to a substantially uniform particle size of less than about 400 mesh.

21) The method of claim 14 wherein said milled glass is milled to a substantially uniform particle size.

22) The method of claim 14 wherein said milled glass is milled to a substantially uniform particle size of less than about 270 mesh.

23) The method of claim 14 wherein said milled glass is milled to a substantially uniform particle size of less than about 325 mesh.

24) The method of claim 14 wherein said milled glass is milled to a substantially uniform particle size of less than about 400 mesh.

25) A method of making a foam glass having a substantially uniform pore size comprising the steps of:

- a. milling a glass precursor consisting essentially of waste soda lime glass to a substantially uniform particle size,
- b. milling an activated carbon foaming agent to a substantially uniform particle size,
- c. providing a mixture of said milled glass precursor and said milled carbon foaming agent,
- d. heating said mixture in the presence of oxygen to a temperature sufficient to react said foaming agent with oxygen.

26) The method of claim 25 wherein said mixture is heated to a temperature of between about 700° C. and about 850° C.

27) The method of claim 25 wherein said mixture is heated to a temperature of between about 750° C. and about 800° C.

28) The method of claim 25 wherein said activated carbon foaming agent is milled to a substantially uniform particle size of less than about 270 mesh.

29) The method of claim 25 wherein said activated carbon foaming agent is milled to a substantially uniform particle size of less than about 325 mesh.

30) The method of claim 25 wherein said activated carbon foaming agent is milled to a substantially uniform particle size of less than about 400 mesh.

31) The method of claim 25 wherein said milled glass is milled to a substantially uniform particle size.

32) The method of claim 25 wherein said milled glass is milled to a substantially uniform particle size of less than about 270 mesh.

33) The method of claim 25 wherein said milled glass is milled to a substantially uniform particle size of less than about 325 mesh.

34) The method of claim 25 wherein said milled glass is milled to a substantially uniform particle size of less than about 400 mesh.

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# United States Court of Appeals for the Federal Circuit

04-1562, -1563, -1589

IN RE OMEPRAZOLE PATENT LITIGATION

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ASTRA AKTIEBOLAG, AKTIEBOLAGET HASSLE,  
ASTRA MERCK ENTERPRISES INC., ASTRA MERCK INC.,  
KBI-E, INC., KBI, INC., and ASTRAZENECA LP,

Plaintiffs-Cross Appellants,

v.

ANDRX PHARMACEUTICALS, INC.,

Defendant-Appellant,

and

GENPHARM, INC., KREMERS URBAN DEVELOPMENT CO.,  
and SCHWARZ PHARMA, INC.,

Defendants.

Errol B. Taylor, Milbank, Tweed, Hadley & McCloy LLP, of New York, New York, argued for plaintiffs-cross appellants. With him on the brief were Fredrick M. Zullo and Lawrence T. Kass; and Jay I. Alexander, of Washington, DC. Of counsel were John M. Griem, Jr. and Claire A. Gilmartin.

Margaret A. Dale, Proskauer Rose LLP, of New York, New York, argued for defendant-appellant. With her on the brief were Louis M. Solomon and Jeremy R. Kasha. Of counsel on the brief were James V. Costigan and Martin P. Endres, Hedman & Costigan, of New York, New York.

Appealed from: United States District Court for the Southern District of New York

Judge Barbara S. Jones

# United States Court of Appeals for the Federal Circuit

04-1562,-1563,-1589

IN RE OMEPRAZOLE PATENT LITIGATION

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and SCHWARZ PHARMA, INC.,

Defendants.

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DECIDED: April 23, 2007

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Before NEWMAN, RADER, and BRYSON, Circuit Judges.

Opinion for the court filed by Circuit Judge RADER.. Opinion concurring in part and dissenting in part filed by Circuit Judge NEWMAN.

RADER, Circuit Judge.

Astra Aktiebolag, Aktiebolaget Hässle, Astra Merck Enterprises Inc., Astra Merck Inc., KBI-E Inc., KBI Inc., Astra Pharmaceuticals L.P., and AstraZeneca L.P. (collectively Astra) filed patent infringement suits against several pharmaceutical

companies that were seeking permission from the Food and Drug Administration (FDA) to market generic versions of Prilosec<sup>®</sup>, Astra's gastric acid inhibiting drug. The United States District Court for the Southern District of New York tried the case in four phases. Following a fifty-two day bench trial, the district court decided in Phases I and III that Andrx's product infringes two of Astra's patents, U.S. Patent Nos. 4,786,505 (the '505 patent) and 4,853,230 (the '230 patent). Astra Aktiebolag v. Andrx Pharm., Inc., 222 F. Supp. 2d 423 (S.D.N.Y. 2002). This court affirmed that judgment. In re Omeprazole Patent Litig., 84 Fed. App'x. 76, 2003 WL 22928641 (Fed. Cir. 2003) (Omeprazole II).

This appeal involves Phases II and IV of the same litigation. The district court entered a final judgment finding that Andrx Pharmaceuticals, Inc. (Andrx) literally infringed claims 1, 2, 3, 7, 9, 16, and 20-21 of Astra Aktiebolag's United States Patent No. 6,013,281 (the '281 patent). The trial court also entered several other judgments about the enforceability of that patent and other Astra patents. In re Omeprazole Patent Litig., M-21-81 (BSJ), MDL Docket No. 1291 (S.D.N.Y. July 15, 2004) (Final Judgment). At the same time, however, the district court also found the asserted claims of Astra's '281 patent anticipated or obvious. Final Judgment, slip op. at 2. Detecting no error of law or fact, this court affirms.

I

Phases I and III of this case produced judgments of patent infringement against Andrx and other defendants. This case, however, involves only the '281 patent and one defendant, Andrx. As set out in the district court's thorough 38-page opinion, Phase II involves infringement and validity of the '281 patent; Phase IV involves Andrx's defenses of inequitable conduct and unclean hands. In re Omeprazole Patent

Litigation, M-21-81 (BSJ), MDL Docket No. 1291 (S.D.N.Y. May 19, 2004) (Omeprazole III). In addition, unlike the patents that claimed a formulation in Phases I and III, the '281 patent claims only a process.

Omeprazole is the generic name for Prilosec®. Astra Aktiebolag v. Andrx Pharm., Inc., 222 F. Supp. 2d 423, 433 (S.D.N.Y. 2002) (Omeprazole I). Omeprazole inhibits the production of gastric acid through a unique mechanism. Id. at 434. After a complex absorption process, Omeprazole transforms into its active species in the parietal cells (acid-producing cells in the stomach lining) and inhibits acid production. Id. However, omeprazole degrades in acidic and neutral environments. Therefore, it must be protected from contact with gastric juices while traveling to the parietal cells. Omeprazole III, slip op. at 3. Thus, an omeprazole formulation needs a protective enteric coating around the core containing the active alkaline reacting compound (ARC) and a separating layer between that core and the coating. Id.

The '281 patent recites a method for making this pharmaceutical formulation. The pharmaceutical formulation is composed of a core that contains a proton pump inhibitor like omeprazole to decrease gastric acid secretion, a water soluble separating layer, and an enteric coating layer. '281 patent, Abstract. Specifically, the '281 patent recites a process for creating the separating layer by causing an in situ reaction involving the enteric-coating material and the ARC in the core. Omeprazole III, slip op. at 4. The reaction creates a salt form of the enteric-coating polymer between the core and the enteric-coating layer. Id. Thus, the '281 process produces an omeprazole formulation with three distinct layers, but starts with only two of the three layers. Id.

This in situ reaction requires a specific ARC concentration in the core. Claim 1, for example, requires more than 0.1 mmol/g dry ingredients in the alkaline-containing core:

1. A process for preparing an oral pharmaceutical formulation comprising the steps of:  
forming a core material comprising a proton pump inhibitor and at least one alkaline reacting compound [ARC], wherein the concentration of the alkaline reacting compound is about 0.1 mmol/g dry ingredients in the alkaline containing part of the core material, and  
applying an enteric coating polymer layer so as to surround the core material thereby forming in situ a separating layer as a water soluble salt product between the alkaline compound and the enteric coating polymer.

'281 Patent col.15 l.65 – col.16 l.9. The remaining claims all depend upon claim 1.

Claim 9, which the district court found obvious, recites:

9. The process according to claim 1, wherein the alkaline reacting compound is an alkaline salt of phosphoric acid, carbonic acid or silicic acid.

'281 Patent col.18 ll.3-5. The '281 process adjusts the variables during the enteric-coating process to account for the particular enteric coatings. Omeprazole III, slip op. at

4. The '281 patent states that “process parameters such as inlet air temperature, air flow, atomizer air flow and spraying rate are adjusted with respect to the equipment used for the process as well as the specific enteric coating polymer(s).” '281 Patent col. 8 ll.51-55. For example, when using hydroxypropyl methylcellulose acetate succinate LF (HPMCAS LF) for applying the enteric coating to a tablet, in the specification under “Examples,” the patent states:

100 grams of . . . core material . . . was film-coated . . . as described below . . . . The dispersion was fed with a rate of 3.8 g/min. Inlet air temperature used was 42 °C[sic] and flow was set to 40 Nm<sup>3</sup>/h. Atomizing airflow used was 2.1 Nm<sup>3</sup>/h, obtained with a pressure of 1.7 bar.

'281 Patent col.11 ll.41-65. After enteric coating, the specification also specifies an increase in the inlet air temperature to 60 °C for approximately five minutes. Id.

The '281 patent issued in the United States on January 11, 2000, with priority back to the February 9, 1995, Swedish application. However, in 1993, before Astra's Swedish filing, a Korean company, the Chong Kun Dan Corporation (CKD), began selling a form of omeprazole under the name "OMP" in Korea. CKD had filed an application (CKD Patent Application) with the Korean Intellectual Property Office (KIPO) for its OMP formulation. The CKD Patent Application became public at KIPO on April 20, 1993. Omeprazole III, slip op. at 2. As a result, Astra questioned CKD about infringement of its Korean process patent for manufacturing omeprazole, a foreign sister to portions of Astra's '505 (Astra's Korean Patent), which issued on November 22, 1988. CKD denied infringement in reliance on its own "unique know-how and . . . patents." CKD's Korean patent publications described compositions with no enteric coating processes. CKD maintained its enteric coating process—its "know how"—as a trade secret.

Astra filed suit in Korea against CKD for infringement. CKD initiated a proceeding in the KIPO, called a "negative confirmation of scope proceeding," seeking an advisory opinion that its process did not infringe Astra's Korean Patents.

This Korean Litigation and its associated KIPO proceedings turned on whether CKD's OMP product contained a subcoating. CKD relied on its two-step process to avoid Astra's Korean '505 patent. This two-step method -- variously referred to in the documents as "Method A," method "No. (Ga)" or method "(Ka)ho" (collectively Method A) -- did not involve a separate third step to make a sub-coating. CKD's description of

Method A included core ingredients (omeprazole, arginine, microcrystalline cellulose, SLS, corn starch and magnesium stearate) and enteric coating ingredients (HPMCAS, ethyl citrate, talc, and sorbitan sesquioleate), but no enteric coating process conditions. Then, in September 1993, CKD submitted a modified list of ingredients for the Method A process, which added the coating agent “HPMC grade 2910,” but still provided no enteric coating process conditions. The '505 patent required a separate application of a subcoating. Omeprazole I, 222 F. Supp. 2d at 444-47. To verify CKD's denials of any third sub-coating application step, Astra conducted various experiments on CKD's product. Astra's investigations and testing of CKD's batches MA00200 and MA00400 led Astra to repeatedly conclude that CKD's product in fact contained a subcoating. Thus, the Astra inventors continued to believe that CKD actually applied a conventional separating layer.

Thereafter, in June 1994, two of Astra's '281 patent inventors, Dr. Kurt Lövgren and Johan Lundberg, Ph.D., postulated instead that neutralizing enteric coating materials may produce a reaction in situ. With this new theory and the conflicting CKD information as a backdrop, Drs. Lundberg and Lövgren conceived the idea of forming a separating layer from enteric coating material neutralized by the ARC during the coating process. During their experiments to create an in situ separating layer, Drs. Lundberg and Lövgren did not know CKD's process for its product.

After much experimentation, on December 15, 1994, Dr. Lundberg developed the process conditions for making an in situ separating layer. Using process conditions, which included lower inlet air temperatures than those used during previous failed experiments, the latest experiments revealed that a separating layer would surprisingly

form at a lower temperature, 42 °C, than previously used. This work became the foundation of the '281 patent.

Then, on December 21, 1994, for the first time, Dr. Lundberg received the process conditions for making CKD's omeprazole product. CKD's protocol for batch NA01200 required an enteric coating inlet air temperature of 70 °C—a temperature that, in Astra's tests, did not form in situ subcoatings. Testing also showed that batch NA01200 differed from earlier produced CKD products (MA00200 and MA00400). Then, in its December 1994 disclosure, CKD changed its September 1993 protocol. These changes added sorbitan sesquioleate and HPMC to its enteric coating recipe.

Finally, on January 5, 1995, Dr. Lundberg coated tablet cores with ingredients matching CKD's NA01200 batch record, employing his own process conditions, i.e., a processing inlet air temperature of 42 °C, and not the 70 °C temperature required by CKD's protocol. In an "In-House Pharmaceutical Report," Dr. Lundberg reported that all of the in situ separating layers from water-based enteric coatings formed at inlet air temperatures of 42 °C or lower.

On October 6, 1996, Astra Aktiebolag filed United States Application Number 09/413,521 (the '521 application), later issued as the '281 patent. On December 19, 2000, the United States Patent and Trademark Office (PTO) examiner issued an office action rejecting claims 1 through 20 of the application. On March 22, 2001, Astra filed a preliminary amendment to claims 21 through 52. In April, the PTO examiner allowed claims 21 through 52. Then, on July 20, 2001, the applicants submitted a petition to withdraw the '521 application from issuance and to submit an information disclosure statement. With the information disclosure statement, the applicants disclosed five

documents with descriptions of the Korean proceedings (the Korean Information). After considering the Korean Information in September of 2001, the PTO examiner issued a notice of allowance on September 24, 2001. In the notice of allowance, the PTO examiner indicated that the claims were all patentable over the Korean prior art.

Meanwhile, CKD consistently represented to Astra, the applicant inventors, and the Korean courts that its product did not have, or need, a separating layer because CKD used a large amount of the specialized alkaline compound, arginine. In making this representation, CKD relied on its testing of CKD's batch NA01200 and the report of an outside expert, Dr. Jong-Kuk Kim, who viewed a production run for batch NA01200. The CKD Patent Application purports to disclose an omeprazole formulation whose stability relies on the zwitterionic amino acids (like arginine) in the core. The CKD Patent Application does not disclose any enteric coating process conditions or the basic details concerning enteric coatings. Notably, the CKD Patent Application expressly disavows the presence of a separating layer. CKD told the Korean court that its product also did not have a separating layer.

## II

The district court found that Andrx literally infringed Astra's '281 patent. Omeprazole III, slip op. at 14-18. Indeed, Andrx admitted that its process met all but one portion of claim 1 of the '281 patent—the portion requiring in situ formation of a separating layer. Id., slip op. at 12. Regardless, Andrx disagrees with the district court's construction of "a water soluble salt" in claim 1. '281 Patent col.5 ll.42-43.

The infringement analysis proceeds as a two-step process: claim construction, followed by comparison of the claims to the accused device. N. Am. Container, Inc. v.

Plastipak Packaging, Inc., 415 F.3d 1335, 1344 (Fed. Cir. 2005). This court reviews claim construction without deference, Cybor Corp. v. FAS Tech., Inc., 138 F.3d 1448, 1455 (Fed. Cir. 1998), and infringement for clear error, Power Mosfet Techs., L.L.C. v. Siemens AG, 378 F.3d 1396, 1406 (Fed. Cir. 2004).

Andrx argues that the district court erred in finding that its product infringes the '281 patent because it does not have a water soluble separating layer, but instead a layer composed of "almost 50% talc." According to Andrx, its separating layer with talc is not water soluble, but only disintegrates in water. Andrx asserts that disintegration is not soluble. Indeed, the '505 and '230 patents claim a "subcoating which rapidly dissolves or disintegrates in water" and a "subcoating which is soluble or rapidly disintegrating in water," respectively. Omeprazole I, 222 F. Supp. 2d at 446.

The '281 patent indeed claims "a water soluble salt." '281 Patent col.16 l.8. The district court correctly discerned that this language permits the inclusion of talc. The language of claim 1 does not claim a separating layer that is water soluble. Claim 1 instead recites a salt product that is water soluble. The '281 patent specification, under "Summary of the Invention," describes the separating layer as comprising "a water soluble salt of an enteric coating polymer." '281 Patent col.5 ll.42-43 (emphasis added). A sentence later, the patent specification states: "a separating layer comprising a water soluble salt of an enteric coating polymer is obtained." '281 Patent col.5 ll.48-49 (emphases added). In addition, example 1 (and 4-7) of the '281 patent employs an enteric-coating layer that contains HPMCAS as well as triethylcitrate, sodium laurylsulphate, and talc. '281 Patent col.8 l.65 - col.9 l.51. Thus, the district court

correctly interpreted the '281 patent claim to permit inclusion of talc in the separating layer.

The trial court did not err by referring to the Omeprazole I opinion, which covered Phase I, because it pointed to a portion of its opinion that discussed the water solubility of the salt of the enteric coating. In Phase I, the district court found

that the HPMCP-salt layer is film-forming and “soluble or rapidly disintegrating in water” as that phrase is used in the '505 and '230 patent claims . . . [and that] the presence of talc does not affect this court's finding that the HPMCP-salt subcoating is soluble in water—it is expressly listed as an appropriate ingredient in the patents. (citations to record omitted).

222 F. Supp. 2d at 539 (emphasis added). This finding applied correctly to the '281 patent claims that do not require that the entire separating layer be water soluble, but only that the salt product be water soluble. In discussing the entire subcoating, the district court noted that the presence of talc does not affect the solubility of the salt. Id. In addition, the district court found in Phase II, that “[p]ersons skilled in the art would understand that each of those components [such as talc] are also present in the in situ layer generated by the claimed process, as well as in the enteric-coating layer.” Omeprazole III, slip op. at 11-12. Indeed, the district court received testimony in Phase II that the contents of the enteric coat would inevitably become a part of the separating layer's salt because it is the result of a reaction between the HPMCP, which converts to a salt, in the enteric coat and the core, which contains an alkaline reacting compound:

Dr. Davies explained that the salt layer is the result of a reaction between the HPMCP in the enteric-coating material and the DHP in the active layer. The talc from the enteric-coating spray remains in the HPMCP-salt layer when the HPMCP converts to the salt. (Davies Tr. 992:16-993:4 (“Talc is placed on the product in the enteric coating layer. It is still present during the formation of the HPMCP salt layer. . . . [The] salt layer [and] the enteric coating layer both contain talc.”).)

Omeprazole I, 222 F. Supp. 2d at 530. Therefore, even though the district court was comparing Andrx's product to the '505 and '230 patent claims, those claims, likewise, recite a water soluble salt product despite the presence of a talc during its formation. In addition, the '281 patent's five preferred embodiments clearly state that they contain talc. As shown in testimony, the talc would still be present in the formation of the separating layer's salt-product. Thus, the district court did not err in its claim construction or its conclusion that Andrx's product infringed the '281 patent.

### III

The district court found that the CKD patent application anticipated claims 1, 2, 3, 7, 16, and 20-21 of the '281 patent. Omeprazole III, slip op. at 2. The CKD patent application became public on April 20, 1993, id., slip op. at 20, and contained all of the elements claimed in the anticipated claims. That application also disclosed the exact proportions of the principal ingredients in the '281 patent's example 1. Omeprazole III, slip op. at 7. The only '281 "limitation" missing from the Korean application is the language "thereby forming in situ a separating layer."

Anticipation requires disclosure of each and every claim limitation in a single prior art reference, either explicitly or inherently. MEHL/Biophile Int'l Corp. v. Milgraum, 192 F.3d 1362, 1365 (Fed. Cir. 1999). An anticipation analysis requires a comparison of the construed claim to the prior art. Helifix, Ltd. v. Blok-Lok, Ltd., 208 F.3d 1339, 1346 (Fed. Cir. 2000).

Astra asserts that the claim limitation, "forming in situ a separating layer," is not found in the CKD Patent Application. Astra also contends that the '281 patent contains

an additional limitation requiring performance of the claimed process at a temperature below 42 °C.

At the outset, the asserted 42 °C “limitation” is only an example from the specification. Absent some clear intent to the contrary, this court does not import examples from the specification into the claims. Constant v. Advanced Micro-Devices, Inc., 848 F.2d 1560, 1571 (Fed. Cir. 1988) (“[E]mbodiments and examples appearing in the specification will not generally be read into the claims.”). The 42 °C “limitation” does not appear in the claims. Moreover, the specification suggests variable temperatures, not a 42 °C requirement: “The process parameters such as inlet air temperature, air flow . . . are adjusted with respect to the equipment used as well as the specific enteric polymer . . . .” ’281 Patent col.8 ll.51-57. Thus, the district court did not err in refusing to read Astra’s alleged 42 °C limitation into Claim 1 of the ’281 patent.

The “in situ formation of a separating layer” limitation presents a more difficult issue. The CKD patent application does not explicitly recite this feature. Therefore, anticipation turns on whether the CKD application inherently disclosed “in situ” formation. The CKD application disavowed a subcoating and disclosed no process conditions to form a separating layer in situ.

Nonetheless, in finding inherent anticipation, the district court relied on and set out in its opinion the assertions Astra made during the Korean Litigation and KIPO proceedings:

- that the CKD process (Method A) claimed in the CKD Patent Application resulted in the in situ formation of a separating layer in CKD’s OMP tablet, Omeprazole III, slip op. at 29;
- that Method A forms a separating layer, even though Method A does not have a separate step of applying the separating layer, id., slip op. at 30;

- that Method A formed a separating layer and that such formation is inherent in the process of Method A, id., slip op. at 30-31;
  - “The construction of the inner coating layer formed in Method A is exactly that of the inner coating layer claimed in [the ’505 patent],” id., slip op. at 31;
  - “[u]ltimately Method A contains the inner coating layer process,” id.;
  - “the inner coating layer of the ‘OMP tablet’ is created instantly at the point of time when the substance of coating the enteric coating is sprayed,” id.;
  - According “to the content of the Expert opinion . . . with the start of the process of the enteric coating of the OMP tablet, HPMCAS, which is an enteric coating substance, instantly reacts with the L-arginine that is in the core and forms a thin membrane, i.e., an inner coating layer,” id.;
- Dr. Lövgren contended that the CKD process resulted in the formation of a separating layer, id.;
- C.T. Rhodes, Ph.D., who Astra relied on in the proceedings in Korea against CKD, opined that the CKD product contained an in situ layer, id..

Astra does not deny these statements. Furthermore, as noted by the district court: “If Astra had scientific proof with which to rebut or refute its prior admissions of inherency, it surely would have put on such proof. Astra did not.” Id., slip op. at 32. Furthermore, Dr. Umesh Banakar, Andrx’s expert, testified that if a formulator followed the CKD process as described in the CKD Patent Application, the separating layer would form in situ “each and every time.” Id., slip op. at 29. In addition, the district court accorded “little if any weight” to Astra’s contrary expert testimony from Dr. Robert Langer’s testimony, in part because Astra did not provide Dr. Langer “with any of the submissions (including test results) on which Astra relied in Korea to prove that the formation of a separating layer naturally results from the CKD process.” Id. The district court acting as factfinder found credible that evidence of inherent in situ formation, and we find no clear error in that determination. The district court did not settle for proof that in situ formation could result from the CKD process, as is suggested in the dissent; rather, the district court credited evidence that in situ formation does result from the CKD process.

As noted, a prior art reference without express reference to a claim limitation may nonetheless anticipate by inherency. See In re Cruciferous Sprout Litig., 301 F.3d 1343, 1349 (Fed. Cir. 2002). Moreover, “[i]nherency is not necessarily coterminous with knowledge of those of ordinary skill in the art. Artisans of ordinary skill may not recognize the inherent characteristics or functioning of the prior art.” Id.; Schering Corp. v. Geneva Pharms., 339 F.3d 1373, 1377 (Fed. Cir. 2003) (rejecting the contention that inherent anticipation requires recognition in the prior art). Though Drs. Lövgren and Lundberg may not have recognized that a characteristic of CKD’s Method A ingredients, disclosed in the CKD Patent Application, resulted in an in situ formation of a separating layer, the in situ formation was inherent.

The record shows formation of the in situ separating layer in the prior art even though that process was not recognized at the time. The new realization alone does not render that necessary prior art patentable. Id. (citing Atlas Powder, 190 F.3d at 1347) (“[T]he discovery of a previously unappreciated property of a prior art composition, or of a scientific explanation for the prior art’s function, does not render the old composition patentably new to the discoverer.”); Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc., 246 F.3d 1368, 1376 (Fed. Cir. 2001) (explaining that newly discovered results of known processes are not patentable because those results are inherent in the known processes); Verdegaal Bros., Inc. v. Union Oil & Co. of Cal., 814 F.2d 628, 633 (Fed. Cir. 1987) (holding that the recognition of a new aspect of a known process is not a patentable invention of a novel process). Despite CKD’s denials, Drs. Lövgren and Lundberg realized and explained that CKD’s OMP tablet’s formation of a separating layer was a natural result flowing from the combination of certain ingredients listed in

Method A. That explanation, however, does not make that prior art patentable. The ingredients and protocols CKD gave to the KIPO and Astra in 1993 and 1994 necessarily resulted in in situ formation of a separating layer. Thus, the trial court correctly found inherent anticipation.

#### IV

Claim 9 of the '281 patent is dependent on claim 1. Claim 9 claims the ARC as an alkaline salt of phosphoric acid, carbonic acid, or silicic acid. The district court found that, in light of the CKD Patent Application, it would have been obvious to a person of ordinary skill in the art to substitute the alkaline salts called for by claim 9 of the '281 patent for the arginine disclosed in the CKD Application. In other words, the district court concluded that it would have been obvious to substitute one ARC for another. Omeprazole III, slip op. at 35. Obviousness under 35 U.S.C. § 103 is a legal conclusion based on underlying factual determinations. Medichem, S.A. v. Rolabo, S.L., 437 F.3d 1157, 1164 (Fed. Cir. 2006).

CKD's patent application coats a core containing an amino acid or an alkali salt of omeprazole as the "basic part" or "alkali reaction component." Id. The district court (and the Korean Appellate Court) found that the CKD application lists arginine as the "basic part" of the core and, alternatively, L-arginine as "an alkali substance." Id. at 35; (Korean) Appellate Trial Court Decision at 3, In Re Omeprazole Patent Litig., Appeal Nos. 04-1562, 04-1563, 04-1589 (Fed. Cir. Aug. 13, 2004). Before the appellate court in Korea, Astra conceded that "L-arginine is generally known as an alkaline reactive compound." Id., Astra's Supplement of the Reasons for the Request for Appeal (to Korean Appellate Court), at 8. Astra also acknowledged that its patented invention

could easily “substitute alkaline reactive compounds [for the] L-arginine in Method A.” Id. at 7-8.

The record shows that Dr. Banakar testified that it would have been obvious to a person of ordinary skill in the art of pharmaceutical formulation to replace the arginine in the CKD application with an alkaline salt of phosphoric acid, carbonic acid, or silicic acid. As Dr. Banakar noted, all such substances are ARCs that can stabilize omeprazole. Omeprazole III, slip op. at 36. The district court noted that “Dr. Banakar’s testimony is corroborated by Astra’s own admissions that arginine is ‘just like’ other ARCs and ‘it is easy to substitute’ arginine for another ARC.” Id.

Astra countered that these statements in the Korean proceedings “addressed whether arginine can function as an ARC stabilizing agent in the context of the Korean ‘505 sister patent - not the ‘281 patent at issue.” However, Astra still admitted that an ARC could easily replace CKD’s L-arginine. Therefore, this court finds no clear error in the district court’s factual findings and no error in its conclusion that it would have been obvious to one skilled in the art to substitute one ARC for another. Therefore, claim 9 of the ‘281 patent would have been obvious at the time of invention.

## V

Andrx argues the district court erred in declining to find the ‘281 patent unenforceable through inequitable conduct and fraud on the PTO and in denying its claim for attorney fees under 35 U.S.C. § 285. Andrx also states in its brief that it “is entitled to a ruling on its counterclaims” and that “the district court must rule on the inequitable conduct and fraud claims for the determination of attorney fees under 35 U.S.C. § 285.” Appellant’s Br. at 51. The district court did not entertain Andrx’s

inequitable conduct and fraud defenses because it considered them “mooted by [its] rulings that each of the asserted claims of the ’281 patent is invalid.” Omeprazole III, slip op. at 37. The district court did consider Andrx’s “unclean hands” argument, but found no evidence to support a finding of “unclean hands.” Id., slip op. at 39. This court reviews an ultimate inequitable conduct determination for abuse of discretion and the underlying determinations including materiality and intent under the clearly erroneous standard. Molins PLC v. Textron, Inc., 48 F.3d 1172, 1178 (Fed. Cir. 1995). Andrx bears the burden of proving by clear and convincing evidence that Astra acted with unclean hands. See generally 6 Donald S. Chisum, Chisum on Patents: A Treatise on the Law of Patentability, Validity, and Infringement § 19.03[5] (2001).

Andrx’s “unclean hands,” fraud, and inequitable conduct arguments were much more limited before the district court than as presented to this court. Before the district court, Andrx raised an “inventors’ oath” argument claiming that the ’281 inventors were not truly the inventors of the process claimed in the ’281 patent. On inequitable conduct during prosecution of the ’505 and ’230 patents, the district court stated:

After a complete review of the hundreds of pages of proposed findings of fact and conclusions of law submitted by Andrx in support of its unclean hands theory, the court is utterly unpersuaded.

Omeprazole III, slip op. at 37-38. As evidence of unclean hands, Andrx asserted “(1) delay of trial; (2) affirmative use of tainted evidence; and (3) withholding significant documents until after the Phase I and II trials were completed.” Id., slip op. at 37. The district court attributed delay equally to Andrx and Astra. Furthermore, the trial court noted that Andrx, not Astra, requested that the ’281 patent be tried with the ’505 and ’230 patents. Id., slip op. at 38. Now before this court, Andrx hopes to argue that

Astra's inventors misrepresented facts to the PTO and deliberately failed to disclose the Korean Litigation and KIPO proceedings to the PTO. This court need not reach issues Andrx did not raise properly in proposed post-trial findings before the District Court. Viskase Corp. v. Am. Nat'l Can Co., 261 F.3d 1316, 1326 (Fed. Cir. 2001).

The district court stated that it would "not make detailed findings concerning Andrx's additional defenses pertaining to the '281 patent, which are mooted by this court's rulings that each of the asserted claims of the '281 patent is invalid." Omeprazole III, slip op. at 37. The inequitable conduct claim was not technically moot, because it would have rendered the entire '281 patent unenforceable, rather than just the claims that were held invalid. Nonetheless, the court's ruling on mootness did not prejudice Andrx, because the record contains no support for Andrx's argument that the '281 patent inventors' conduct before the PTO constituted inequitable conduct. Instead, the inventors disclosed the Korean litigation and KIPO proceedings. The PTO examiner had the benefit of this information before allowance of the patent. Furthermore, the record shows that CKD consistently represented to the '281 patent inventors that their omeprazole product did not have a separating layer. Thus, those inventors had every reason to believe that they had invented the process disclosed in the '281 patent. As a result, nothing in the record would support a finding that the inventors engaged in inequitable conduct. The district court did not err or abuse its discretion in finding that Andrx did not show fraud, "unclean hands," or inequitable conduct. Without a finding of inequitable conduct in the first instance, Andrx cannot possibly prevail with its new contentions of "infectious unenforceability" against all patents in suit, including the '230 and the '505 (which were held valid and infringed).

Lastly, in August 2004, after it issued its opinion on the two phases on appeal here, the district court found Astra, not Andrx, the “prevailing party.” In re Omeprazole Patent Litigation, M-21-81 (BSJ), MDL Docket No. 1291 (S.D.N.Y. August 8, 2004) (Costs Order). In the words of the trial court, “Astra is the prevailing party because its successes on its affirmative claims far outweigh any gains Defendants made on their counterclaims.” Costs Order, slip op. at 3.

This court reviews a denial of attorney fees under 35 U.S.C. § 285 for an abuse of discretion; however, this court reviews the factual determination of whether a case is exceptional under § 285 for clear error. Q-Pharma, Inc. v. Andrew Jergens Co., 360 F.3d 1295, 1299 (Fed. Cir. 2004) In addition, this court reviews the meaning of the term “prevailing party” without deference. Inland Steel Co. v. LTV Steel Corp., 364 F.3d 1318, 1320 (Fed. Cir. 2004) (citing Waner v. Ford Motor Co., 331 F.3d 851, 857 (Fed. Cir. 2003) (“We review de novo whether the district court applied the proper legal standard under 35 U.S.C. § 285, and we review the court's factual findings, including whether the case is exceptional, for clear error.”)).

In Phases I and III of this litigation, the district court found most of the asserted claims infringed: (1) Defendant Genpharm, Inc. (Genpharm) literally infringed claims 1, 5, 6, 8, 9, 10, 12, and 14 of the '505 patent; (2) Genpharm literally infringed claims 1, 6, 7, 10, 11, 12, and 13 of the '230 patent; (3) three other defendants, referred to collectively as “Cheminor,” literally infringed claims 1, 5, 10, and 14 of the '505 patent; (4) Cheminor literally infringed claims 1, 6, 12, and 13 of the '230 patent; (5) Andrx literally infringed claims 1, 5, 6, 8, and 10 of the '505 patent; (6) Andrx literally infringed claims 1, 6, 7, 10, and 13 of the '230 patent. Omeprazole I, 222 F. Supp. 2d at 432-33.

The district court entered an injunction prohibiting all defendants from marketing their generic omeprazole product through 2007. Costs Order, slip op. at 3. Also, though the district court also found claim 1 of United States Patent No. 5,093,342 (the '342 patent) invalid as anticipated, it found the asserted claims of the '505 and '230 patents not invalid. 222 F. Supp. 2d at 433. The district court found that "the *H. pylori* ['342] patent . . . of much less significance than the formulation ['505 and '230] patents." Costs Order, slip op. at 5. Moreover, in Phases II and IV, the district court also found that Andrx literally infringed claims 1, 2, 3, 7, 9, 16, and 20-21 of the '281 patent. Final Judgment, slip op. at 1. Therefore, this court finds no clear error in the district court's conclusion that this case was not exceptional, and finds no error in the district court's conclusion that Astra was the prevailing party. The district court properly applied the proper standards. Because section 285 allows an award of attorney fees only to the "prevailing party," the district court's conclusion that Andrx cannot recover attorney fees is not an abuse of discretion.

## VI

In conclusion, this court affirms the district court's judgment finding that Andrx literally infringed claims 1, 2, 3, 7, 9, 16, and 20-21 of Astra's '281 patent, but that claims 1, 2, 3, 7, 16, and 20-21 of the '281 patent are anticipated and that claim 9 of the '281 patent is obvious. This court also affirms the district court's conclusion that Andrx's counterclaims were mooted, that there was no inequitable conduct, fraud, or unclean hands in Astra's prosecution of the '281 patent, and that Astra's '505 and '230 patents are not unenforceable through "infectious unenforceability."

COSTS

Each party shall bear its own costs.

AFFIRMED

# United States Court of Appeals for the Federal Circuit

04-1562, -1563, -1589

IN RE OMEPRAZOLE PATENT LITIGATION

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ASTRA AKTIEBOLAG, AKTIEBOLAGET HASSLE,  
ASTRA MERCK ENTERPRISES INC., ASTRA MERCK INC.,  
KBI-E, INC., KBI, INC., and ASTRAZENECA LP,

Plaintiffs-Cross Appellants,

v.

ANDRX PHARMACEUTICALS, INC.,

Defendant-Appellant,

and

GENPHARM, INC., KREMERS URBAN DEVELOPMENT CO.,  
and SCHWARZ PHARMA, INC.,

Defendants.

NEWMAN, Circuit Judge, concurring in part, dissenting in part.

I concur in the court's ruling that the claims are infringed if valid, as well as the rulings on the issues of inequitable conduct, fraud, unclean hands, and attorney fees. However, I cannot agree that the claims of the '281 patent are invalid, for the findings of "inherent anticipation" and obviousness are based on incorrect premises of law.

Applying a novel theory of "inherent anticipation," the court invalidates Astra's patent on a newly discovered chemical process: a process involving known ingredients but different and previously unknown reaction conditions and achieving a different result. Based on a flawed analysis of the law of "inherent anticipation," the court invalidates the patent on Astra's previously unknown process for producing an in situ polymeric sublayer for omeprazole. The court apparently reasons that because the ingredients were known, it is irrelevant that a significant change in conditions produces a result that is different from that achieved under the conditions of the prior art. Such a view of "inherency" is contrary to legal as well as scientific principles.

The court's explanation and citation of authority suggest that my colleagues have confused the law governing patentability of a newly discovered use of a known composition, which is achieved by "process" claim,<sup>1</sup> with the unpatentability of the known composition itself. The claims at issue are not directed to a composition; they are directed to a process for forming a sublayer from known ingredients:

Claim 1. A process for preparing an oral pharmaceutical formulation comprising the steps of:

forming a core material comprising a proton pump inhibitor and at least one alkaline reacting compound, wherein the concentration of the alkaline reacting compound is about 0.1 mmol/g dry ingredients in the alkaline containing part of the core material, and

applying an enteric coating polymer layer so as to surround the core material thereby forming in situ a separating layer as a water soluble salt product between the alkaline compound and the enteric coating polymer.

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<sup>1</sup> 35 U.S.C. §100(b) defines "process" as follows: "The term 'process' means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material."

The Astra process is not described in the prior art, although Astra admitted that it believed that the Korean company Chong Kun Dan Corporation (CKD) had made such a product. It is not disputed that such a sublayer does not form under the conditions in the CKD patent application. No such reaction is described in CKD's Korean patent application, nor the conditions that could have produced such a product. Nonetheless, my colleagues rule that the process discovered by Astra is "inherently anticipated" by the CKD application. That is not the law of either anticipation or inherency. I must, respectfully, dissent.

***"Anticipation" Means Lack of Novelty***

Novelty is fundamental to patentability. Lack of novelty, or "anticipation" in patentese, means that the subject matter was previously known in terms of 35 U.S.C. §102.<sup>2</sup> While some properties and uses of known compositions may indeed be "inherently anticipated" in that their existence would have been known to persons in the field of the invention, even if unpublished, that is not this situation. No prior art describes the Astra process, and there is no evidence that a person of ordinary skill would have known of its existence. What is unknown cannot "anticipate."

Anticipation requires that "each element of the claim at issue is found, either expressly described or under the principles of inherency, in a single prior art reference or

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<sup>2</sup> 35 U.S.C. §102 provides that novelty is negated if the invention was known or used by others in the United States, §102(a); or if the invention was patented or described in a printed publication, §102(b); or in public use or on sale, §102(b); or derived from another, §102(f); or the prior invention of another who did not abandon, suppress, or conceal it, §102(g).

that the claimed invention was previously known or embodied in a single prior art device or practice." Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 771 (Fed. Cir. 1983). See MEHL/Biophile Int'l Corp. v Milgraum, 192 F.3d 1362, 1365 (Fed. Cir. 1999) (to anticipate, a single reference must teach every limitation of the claimed invention; any limitation not explicitly taught must be inherently taught and would be so understood by a person experienced in the field); In re Baxter Travenol Labs., 952 F.2d 388, 390 (Fed. Cir. 1991) (the dispositive question is "whether one skilled in the art would reasonably understand or infer" that a reference teaches or discloses all of the elements of the claimed invention); Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1268-69 (Fed. Cir. 1991) (to anticipate, every element of the claims must appear in a single prior art reference, or if not expressly shown, then demonstrated to be known to persons experienced in the field of technology); In re Samour, 571 F.2d 559, 562 (CCPA 1978) (the key question is whether a single prior art reference "publicly discloses every material element of the claimed subject matter").

The principle of "inherency," in the law of anticipation, requires that any information missing from the reference would nonetheless be known to be present in the subject matter of the reference, when viewed by persons experienced in the field of the invention. However, "anticipation by inherent disclosure is appropriate only when the reference discloses prior art that must necessarily include the unstated limitation, [or the reference] cannot inherently anticipate the claims." Transclean Corp. v. Bridgewood Servs., Inc., 290 F.3d 1364, 1373 (Fed. Cir. 2002) (emphasis in original); Hitzeman v. Rutter, 243 F.3d 1345, 1355 (Fed. Cir. 2001) ("consistent with the law of anticipation, an inherent property must necessarily be present in the invention described by the count, and it must be so

recognized by persons of ordinary skill in the art"); In re Robertson, 169 F.3d 743, 745 (Fed. Cir. 1999) (that a feature in the prior art reference "could" operate as claimed does not establish inherency).

Thus when a claim limitation is not explicitly set forth in a reference, evidence "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." Continental Can Co., 948 F.2d at 1268. It is not sufficient if a material element or limitation is "merely probably or possibly present" in the prior art. Trintec Indus., Inc. v. Top-U.S.A. Corp., 295 F.3d 1292, 1295 (Fed. Cir. 2002). See W.L. Gore v. Garlock, Inc., 721 F.2d at 1554 (Fed. Cir. 1983) (anticipation "cannot be predicated on mere conjecture respecting the characteristics of products that might result from the practice of processes disclosed in references"); In re Oelrich, 666 F.2d 578, 581 (CCPA 1982) (to anticipate, the asserted inherent function must be present in the prior art).

Applying these principles, it is incorrect to hold that the CKD application "inherently anticipates" the '281 invention. The panel majority contravenes this vast body of precedent, for it is not disputed that no reference explicitly or inherently teaches the process that Astra found to produce an in situ polymeric sublayer. The requirements of inherent anticipation were not met.

### ***Anticipation Also Requires Enablement***

To "anticipate," the identical subject matter must not only be previously known, but the knowledge must be sufficiently enabling to place the information in the possession of the public. In Seymour v. Osborne, 78 U.S. 516 (1870), the Supreme Court explained:

Patented inventions cannot be superceded by the mere introduction of a [prior art reference] unless the description and drawings contain and exhibit a substantial representation of the patented improvement, in such full, clear, and exact terms as to enable any person skilled in the art of science to which it appertains, to make, construct, and practice the invention to the same practical extent as they would be enabled to do if the information was derived from a prior patent. Mere vague and general representations will not support such a defense, as the knowledge supposed to be derived from the publication must be sufficient to enable those skilled in the art or science to understand the nature and operation of the invention, and carry it into practice use. Whatever may be the particular circumstances under which the publication takes place, the account published, to be of any effect to support such a defense, must be an account of complete and operative invention capable of being put into practical operation.

78 U.S. at 555 (emphases added). Precedent illustrates this principle in many areas of technology. See, e.g., Elan Pharmaceuticals, Inc. v. Mayo Foundation, 346 F.3d 1051, 1054-55 (Fed. Cir. 2003) (anticipation requires enablement, whereby the reference "must teach one of ordinary skill in the art to make or carry out the claimed invention without undue experimentation"); Helifix Ltd. v. Blok-Lok, Ltd., 208 F.3d 1339 (Fed. Cir. 2000) (a prior art reference that does not enable a person of ordinary skill in the art to practice the claimed invention does not anticipate the patent claims); Akzo N.V. v. United States Int'l Trade Comm'n, 808 F.2d 1471, 1480 (Fed. Cir. 1986) (anticipation requires that the reference publicly discloses all elements of the claimed invention and enables its practice); Paperless Accounting, Inc. v. Bay Area Rapid Transit Sys., 804 F.2d 659, 665 (Fed. Cir. 1986) (a non-enabling publication is insufficient to anticipate under §102(b), although it may raise §103 issues).

All parties agree that the closest prior art is the Korean CKD application. It was not disputed that the ingredients of the Astra and the CKD omeprazole formulations are the same standard enteric ingredients. Several references describe the use of microcrystalline

cellulose plus an alkaline-reacting compound to formulate pharmaceuticals for drug delivery. However, no reference describes the conditions by which Astra produced an in situ interior sublayer. No reference suggests formulation temperatures at or below 42°C, or that such a sublayer might form at such low temperatures.

Andrx's expert witness Dr. Banakar agreed that it was not possible to know, from the CKD Korean application, how or if the reaction conditions could be changed so as to produce an in situ sublayer. Although the panel majority states that Dr. Banakar testified that "if a formulator followed the CKD process as described in the CKD Patent Application, the separating layer would form in situ 'each and every time,'" on cross-examination Dr. Banakar admitted that he had conducted no experiments and his conclusion was without verification. He stated that his sole basis for "each and every time" was the Astra argument in the Korean proceedings, the argument that was negated by the evidence in the Korean court, including the testimony of Professor Chung, the Korean court-appointed expert. In all of the proceedings, in Korea and in the United States, it was never disputed that the CKD application does not disclose a separating sublayer, and that such a sublayer does not form in the conditions described for the CKD process. CKD testified in the Korean court that it consistently operated at or near the 70°C set forth in the CKD Korean application, and that no in situ sublayer was produced.

In the present litigation, the Andrx expert Dr. Banakar testified that specific process conditions are necessary to form an in situ separating layer, that such conditions are different from those set forth in the Korean application, and that his only basis for proposing that the Koreans formed an in situ sublayer was because Astra had unsuccessfully so argued in Korea. Astra states that its argument was based not on information contained in

the Korean patent application or gleaned in the Korean litigation, but on testing of a CKD product. It is not now disputed that the Korean process does not produce a separating sublayer.

By no stretch of fact or law can the Korean application inherently anticipate what it could not produce. A non-enabling reference cannot serve as an invalidating anticipation, either expressly or inherently. My colleagues on this panel, holding otherwise, do not explain how they plug this scientific and legal gap. Such an unexplained finding of inherent anticipation does not add clarity to this jurisprudence.

***Secret Information Cannot "Anticipate"***

My colleagues speculate that CKD practiced a sublayer-producing process in secrecy, although the Korean inventors denied such practice in the proceedings in the Korean Patent Office and also in the Seoul District Court. Whatever may or may not have been done in secret in Korea does not convert a secret and still unknown process into prior art.

"Anticipating" subject matter must be known, and the knowledge must be sufficient to place enabling information in the possession of the public. See, e.g., Vulcan Eng'g Co. v. FATA Aluminium, Inc., 278 F.3d 1366, 1372-73 (Fed. Cir. 2002) (a secret system that was not known or publicly used in the United States is not prior art and cannot "anticipate"); Woodland Trust v. Flowertree Nursery, Inc., 148 F.3d 1368, 1371 (Fed. Cir. 1998) (secret prior use or knowledge by another is not a bar to patentability).

The Korean court found that an in situ sublayer was not produced by the process set forth in the CKD specification. I repeat, this finding is not challenged by any evidence

presented in this case. Even if CKD indeed practiced a secret process in Korea, and made a sublayer while concealing the process, such an unknown process is not an inherent anticipation.

### ***Patentability of the '281 Process***

Astra informed the United States patent examiner that the Korean proceedings included CKD's challenge to the validity of the Korean counterpart of Astra's '281 patent. Astra submitted to the PTO, with English translations, CKD's Korean patent application, Astra's Opposition Statement, the Korean Patent Office's Confirmation of Scope decision of September 25, 1994, Astra's evidence that the CKD product has a separating sublayer, and the Korean district court's ruling that the CKD process does not produce an in situ separating sublayer.

On this background, the United States examiner found that the '281 process was patentable. My colleagues on this panel rely on cases which hold that a known composition cannot be re-patented as a composition when a new property is discovered, citing Atlas Powder, 190 F.3d at 1347, and Bristol-Myers Squibb, 246 F.3d at 1376. That is a correct statement of law, but irrelevant to this case. The '281 claims are not for a known composition; the claims are for a newly discovered process. See Loctite Corp. v. Ultraseal Ltd., 781 F.2d 861, 875 (Fed. Cir. 1985) (a new process is patentable subject matter, whether or not the product is already known); Atlantic Thermoplastics Co., Inc. v. Faytex Corp., 970 F.2d 834, 841 (Fed. Cir. 1992) ("In the words of the Supreme Court, 'While a new process for producing [a known composition] was patentable, the product itself could not be patented . . .'" (quoting Cochrane v. Badische Anilin & Soda Fabrik, 111

U.S. 293, 312 (1884)); Ansonia Brass & Copper Co. v. Electrical Supply Co., 144 U.S. 11 (1892). No reference shows the process conditions by which Astra produced the sublayer.

### ***Obviousness of Claim 9***

The invalidation of claim 9 is a misapplication of the law of obviousness, for there was no prior art or even general knowledge that suggested that a major lowering of the formulating temperature would cause a polymeric sublayer to form in situ. The court's invalidation of claim 9 appears to be founded on the postulate that CKD had a secret process for making the disavowed sublayer. Accepting that Astra's scientists, Dr. Lovgren and Dr. Lundberg, believed that CKD had made an in situ sublayer and thereby were spurred to experimental investigation, that did not render their success obvious. Obviousness cannot be based on secret or concealed information.

In addition, no references have been cited to suggest that the phosphoric acid, carbonic acid, or silicic acid of Astra's claim 9 should replace the zwitterionic L-arginine in the Korean formulation. And no reference suggested that such a change, combined with a significant temperature reduction, would produce an in situ separating sublayer. Hindsight is not an available analytical mechanism to show obviousness. See Interconnect Planning Co. v. Feil, 774 F.2d 1132, 1138 (Fed. Cir. 1985) ("The invention must be viewed not with the blueprint drawn by the inventor, but in the state of the art that existed at the time.")

## ***Conclusion***

It is apparent that the requirements of "inherent anticipation" are not met. A consistent law, and consistent application, are critical to technological innovation.<sup>3</sup> The panel majority's divergence from precedent not only has led the court to invalidate a fully valid patent, but also brings further uncertainty to this important aspect of patent law.

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<sup>3</sup> In summarizing cases showing that Federal Circuit decisions have "oscillated" with respect to inherent anticipation,<sup>1</sup> Chisum on Patents, §3.03[2][c], p. 3-83 (2006) states "some [Federal Circuit panels] stating that recognition is required, others stating that recognition is not required."